

Effects of Teacher's Qualification on Students' Achievement in Senior Secondary School Chemistry

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Abstract

The purpose of the study is to determine the effects of teachers' qualification on students' achievement in senior secondary school chemistry in Idah Local Government Area of Kogi State. Four hypotheses guided the study. An expo-post facto survey research design was adopted for the study. The target population was all the SS2 chemistry students in the 22 senior secondary schools in Idah Local Government Area of Kogi State. Two hundred and twenty-six (226) SS2 chemistry students from eight senior secondary schools were sampled and used for the study. One validated and reliable instrument titled Senior Secondary Two Chemistry Achievement Test (SSTCAT, $r = 0.79$) was used for collection of data. Data were analysed using t – test. The results showed that students do not differ significantly in their academic achievement when taught by teachers holding B.Sc. Ed and those taught holding B.Sc only. The results also revealed that students exposed to teachers holding B.Sc. plus PGDE or PCE performed significantly better than those exposed to only B.Sc, among others. It was recommended, that teachers' training institutions should ensure that only intelligent students with high JAMB/Post-UME scores are admitted to read education courses and that unqualified teachers should enroll for further studies in the field of education.

Keywords: Teachers qualification, students' achievement, senior secondary and chemistry

INTRODUCTION

In recognition of the role of chemistry to the socio-economic development of any nation, the curriculum planners deem it necessary to introduce chemistry along with other basic science subjects (biology and physics) in the senior secondary school level of Nigerian educational system. The objectives of chemistry education at this level of education among others include to: provide students with basic knowledge in chemical concepts and principles through efficient selection of content and sequencing show chemistry and its inter-relationship with other subjects provide a course which is complete for students not proceeding to higher education while at same time provide a reasonably adequate foundation for a post-secondary school chemistry course [1]. If this policy document is to be properly implemented, the role of the chemistry teachers cannot be over emphasized. Stressing on the importance of the teacher, the [2] in her national policy on education, states that no educational system may rise above the quality of it's teachers. The policy document further stated that the goals of teacher education shall be to produce

motivated, conscientious and efficient classroom teachers for all levels of the educational system and provide teachers with intellectual and professional background adequate for their assignment among others. Contributing to this theme, Usman in [3] pointed out that a teacher who is well trained and is in command of his/her subject matter will be able to identify the weaknesses and strengths of his/her learners, thereby making teaching and learning more simpler.

Writing on a trained teacher [4], said that a trained teacher is someone who has been exposed to a good measure of training in his/her teaching subject area as well as in professional education thereby such referred to as a qualified teacher. Thus, qualified teachers are those who got training that gave them professional knowledge, skills, techniques, aptitudes as different from general education and they hold degrees such as B.Ed; B.Sc. Ed; B.A. Ed; M.Ed; etc. He went further to explain that unqualified teachers are those who have academic training as a result of enrolment into higher institutions and they obtained certificates such as HND,

B.Sc, B.A., MA and so on. [3] Defined qualified teachers as one who holds teaching certificates and/or licensed by the state, owns at least a minimum of National certificate of education (NCE). The [2] also Pointed out that: the minimum qualification for entry into the teaching profession shall be the Nigeria Certificate in Education (NCE); teachers' Registration Council of Nigeria (TRCN) shall continue to register teachers and regulate teaching profession; and only professional qualified and registered teachers shall be allowed to practice at all levels.

From the above definitions and explanations, a professional qualified teacher in Nigeria is someone who holds NCE or degree in education or degree/HND on a subject area plus Post-graduate diploma in education or post graduate certificate in education and licensed to practice at all levels of education. From this, professional qualified teachers can be categorized into three namely; teachers holding: National Certificate in Education (NCE); Bachelor degrees such as B.Sc.Ed, B.A. Ed or B.Ed and B.Sc.; B.A.; HND plus post graduate diploma in education. (PGDE) or post graduate certificate in education (PCE).

The last two referred to highly qualified teachers who are expected to teach chemistry in the senior secondary schools. Equally non-professional or unqualified teachers can be categorized into two namely; teachers holding senior school certificate examination (SSCE) and National Diploma (ND); and teachers holding B.Sc, B.A, M.Sc, MA. and so on. In all, five categories of science teachers are found in our senior secondary school level: SSCE/OND; NCE; B.Ed/B.Sc/Ed; HND/B.Sc plus PGDE or PCE; and HND/B.Sc. in subject area only.

Studies by [5]; [6] and [7] posited that professional qualification of teachers or teachers' qualification is significantly related to the students' academic achievement in science and mathematics. They have argued that professional qualified teachers may be more involved in using innovative teaching methods and hence a better results than non-professional or unqualified teachers. In

contradicting manners, studies by [8]; [9]; and [3] reported that the professional qualification of a teacher is not significantly related to students' academic achievement. This implies that teachers' qualification is not a sole contributor to students' achievement. The need to contribute to these contradicting reports necessitated this study. Therefore it poised to investigate the effect of teachers' qualification on students' academic achievement in senior secondary school chemistry.

STATEMENT OF THE PROBLEM

There have been reports of students' persistent poor academic achievement in chemistry. This has been attributed to the quality of the teachers. This means that teacher's factor is very crucial to improving students' achievement in chemistry. Therefore, there is a need to assess chemistry teachers in terms of qualification, experience, teaching methodology, etc. But the focus of this work is on qualification of teachers. Thus, the problem put in a question form is: To what extent does teachers' qualification effect students' academic achievement in chemistry in the senior secondary schools?

PURPOSE OF THE STUDY

The objective of this study is to determine the effect of teachers' qualification on senior secondary students' achievement in chemistry. Specifically, the study sought to:

- (1) determine the effect of qualified teachers with degree in education (i.e B.Sc.Ed) and unqualified teachers with degree in other fields (B. Sc.)
- (2) determine the effect of qualified teachers with degree plus PGDE or PCE (B.Sc; PGDE or PCE) and unqualified teachers with degree in other fields (i.e B.Sc.)
- (3) determine the effect of qualified teachers with high qualification (B.Ed) and qualified teachers with low qualification (NCE)
- (4) determine the effect of qualified teachers with low qualification (i.e NCE) and unqualified teachers with low qualification (i.e ND)

HYPOTHESES

The following hypotheses were formulated and tested at 0.05 level of significance.

Ho₁: There is no significant difference between the mean achievement scores of chemistry students taught by qualified teachers with degrees (i.e B.Sc. Ed) and unqualified teachers with degrees in other fields (i.e B. Sc.)

Ho₂: There is no significant difference between the mean achievement scores of chemistry students taught by qualified teachers with degrees plus PGDE or PCE (i.e B.Sc; PGDE or PCE) and unqualified teachers with only degree (B.Sc.)

Ho₃: There is no significant difference between the mean achievement scores of chemistry students taught by qualified teachers with high qualification (i.e B. Ed) and qualified teachers with low qualification (i.e NCE)

Ho₄: There is no significant difference between the mean achievement scores of chemistry students taught by qualified teachers with low qualifications (i.e NCE) and unqualified teachers with low qualification (i.e ND)

METHODS

The study adopted ex – post – facto research design. This was considered because an effect on an outcome has been considered already. This implies that teachers already qualified or not qualified. Also students have already been taught chemistry. Thus the researcher is only working for the outcome. The population of the study comprised of all the 960 senior secondary two (SS2) chemistry students in 22 public and private secondary schools in Idah

Local Government Area of Kogi State. A simple random sampling technique was used to select 8 secondary schools and all the 226 chemistry students of the 8 secondary schools constituted the sample. The researcher targeted third term of SS2 students because they might have covered their SS1 and SS2 chemistry syllabus in preparation for the Kogi State transition examination that qualify them to be promoted to SS3 or register for senior secondary certificate examination (SSCE). The instrument used for data collection was the senior secondary two chemistry achievement test (SSTCAT). The SSII chemistry achievement test consisted of fifty multiple choice items tests with four options selected from the past Kogi State transition examination questions that cover SS1 and SS2 chemistry syllabus. There was no need for content and face validities, since Kogi State transition examination are standard examination whose content and face validities have already been established. However, the reliability of the instrument was established by the researcher using test-retest method. The scores from the first and second tests were correlated using pearson product moment (r) and the reliability coefficient of 0.79 was established and it was considered high and suitable enough for study. The SSTCAT was administered to 226 students from 8 secondary schools by their chemistry teachers. The scripts were collected and submitted to the researcher. The scripts were then marked and sort out according to the categories of the teachers' qualification by the researcher. A proforma was used to collect qualification of chemistry teachers from the principals' office. t–test statistics was used to test the four hypotheses formulated for this study.

Table 1: T – Test of Achievement in Chemistry of Students Taught by Qualified Degree Holders (B.Sc. Ed) and Unqualified Degree Holders (B.Sc.).

Variable	N	\bar{X}	SD	Df	t – Cal	t – crit
Qualified with B.Ed	69	56.32	3.56	110	1.55	1.98
Unqualified with B.Sc	43	57.76	4.92			

Table 2: T–Test Analysis of the Mean Achievement Scores in Chemistry of Students Taught by Qualified Teachers Holding B.Sc.; PGDE or PCE and Unqualified Teachers Holding B.Sc.

<i>Variables</i>	<i>N</i>	<i>\bar{X}</i>	<i>SD</i>	<i>Df</i>	<i>t – cal</i>	<i>T – crit</i>
Qualified teachers with B.Sc; PGDE or PCE	36	60.96	5.26	77	2.78	1.98
Unqualified teachers with B.Sc.	43	57.78	4.92			

Table 3: T – Test Analysis Mean Achievement Scores of Students Taught Chemistry Qualified Teachers Holding High Qualification (B.Sc.Ed) and Qualified Teachers Holding Low Qualification (i.e NCE)

<i>Variables</i>	<i>N</i>	<i>\bar{X}</i>	<i>SD</i>	<i>Df</i>	<i>t – cal</i>	<i>T – crit</i>
Teachers with high qualification (B.Sc.Ed)	69	56.32	3.56	123	2.87	1.98
Teachers with low qualification (NCE)	56	53.98	5.17			

Table 4: T – Test Analysis of Mean Achievement Scores of Students Taught Chemistry by Qualified Teachers with Low Qualification (NCE) and Unqualified Teachers with Low Qualification (ND)

<i>Variables</i>	<i>N</i>	<i>\bar{X}</i>	<i>SD</i>	<i>Df</i>	<i>t – cal</i>	<i>t – crit.</i>
Qualified teachers with low qualification (NCE)	56	53.98	5.17	76	3.88	1.98

Table 4: T – Test Analysis of Mean Achievement Scores of Students Taught Chemistry by Qualified Teachers with Low Qualification (NCE) and Unqualified Teachers with Low Qualification (ND)

<i>Variables</i>	<i>N</i>	<i>\bar{X}</i>	<i>SD</i>	<i>Df</i>	<i>t – cal</i>	<i>t – crit.</i>
Qualified teachers with low qualification (NCE)	56	53.98	5.17	76	3.88	1.98
Unqualified teachers with low qualification (ND)	22	48.71	5.48			

RESULTS

The results were presented according to the hypothesis: 1, 2, 3 and 4.

Hypothesis one

From table 1, the t – calculated (1.55) is less than t – critical (1.98) at 0.05 significance, hence the hypothesis was not rejected. It therefore means that there is no significant difference between the mean achievement scores of students taught chemistry by qualified teachers holding degrees (B.Sc.Ed) in education and those unqualified students taught by teachers holding degrees (B.Sc) in other fields.

Ho₂: There is no significant difference between the mean achievement scores of students taught chemistry by qualified teachers holding degree plus PGDE or PCE (i.e B.Sc.; PGDE or PCE) and those taught by unqualified teachers holding degree (B.Sc.)

Table 3 shows the t – calculated is 2.87 while that of t – critical is 1.98 at 0.05 level of significance at 123 degree of freedom. Since the t – calculated is greater than t – critical, the null hypothesis of no significant difference is rejected, meaning that there is significant difference between the mean achievement scores of students taught chemistry by qualified teachers holding high qualification (i.e B.Sc.Ed) and those students taught by teachers holding low qualifications (i.e NCE)

Hypothesis four

Ho₄: There is significant difference between the mean achievement scores of students taught chemistry by qualified teachers holding low qualification (i.e NCE) and those taught by unqualified teachers holding low qualifications (i.e ND)

Table 4 shows that t – calculated is 3.88 while that of t – critical is 1.98 at 0.05 level of significance at 76 degree of freedom. This implies that t – calculated is greater than t – table, hence null hypothesis is rejected. it therefore, means that there is significant

Ho₁: There is no significant difference between the mean achievement scores of students taught chemistry by qualified teachers with degrees in education (i.e B.Sc. Ed) and those taught by unqualified teachers degrees holding in other fields (i.e B.Sc.)

From table 2, t – calculated (2.78) is more than t – critical (1.98) at 0.05 significance, thus, the null hypothesis was rejected. it means that there is significant difference between the mean achievement scores of students taught chemistry by qualified teachers holding B.Sc plus PGDE or PCE and their counterparts taught by unqualified teachers holding B.Sc. in other fields.

Hypothesis 3

Ho₃: There is no significant difference between the mean achievement scores of students taught chemistry by qualified teachers with high qualification (i.e B.Sc. Ed) and those taught by qualified teachers with low qualification (i.e NCE)

difference between the mean achievement of students taught chemistry by qualified teachers holding low qualification (i.e NCE) and their counterparts taught unqualified teachers holding low qualifications (i.e ND).

DISCUSSION OF FINDINGS

The results of data analysis showed that there is no significant difference between the mean achievement scores of chemistry students taught by qualified teachers holding B.Sc.Ed; B.Ed; M.Ed so on and those taught by unqualified teachers holding degrees in other fields like: natural science, engineering, agricultural science, etc. This finding is in line with the findings of [9] and [3] who found out that teachers' professional qualification is not significantly related to students' academic achievement. But at variance with the findings of [10], [11]; [5]; [6] and [7] who showed that significant difference existed between the achievement of students taught by professional qualified teachers and academically qualified teachers without teaching qualifications in favour of professional qualified teachers. The current finding which is a variance with

preponderance of literature in this area of research can be explained as thus: According to [12] while quoting Obanya's view, 80% of those who enrolled in faculty of education in our universities never had the interest to teach after graduating, thus we have people who have forced themselves into the teaching profession may be as a result of not getting admission to read a science based professional courses (Medicine, Pharmacy, Engineering, Microbiology etc) or are not keen in actually doing the job. [13] has also argued that it only the bottom liners, or rejects of admission into other science based professions such as engineering, natural science, etc that are admitted to read science education in our universities. For instance in 2016, JAMB/Post-UME cut-off point for students seeking admission into Kogi State university to read microbiology was 60, while students seeking admission read biology education or any education course had cut-off point of 40. Therefore it is not surprising that on graduation, a microbiologist (B.Sc. Microbiology) who finds his/her self in teaching profession would perform creditably well when compared to their colleagues who read education Biology (B.Sc.Ed biology). This exactly is the finding of this study. The educational implication of the finding is that universities and institutes of education that train teachers should raise the cut-off point for admission of education students to match that of other professions like engineering, natural science, etc.

The study also revealed that there is significant difference between chemistry students' mean achievement score of students taught by qualified teachers holding B.Sc. plus PGDE or PCE and those taught by unqualified teachers who possess degrees in science related field only in favour of qualified teachers with PGDE or PCE. This finding corroborates with the findings of [14], [5]; [6] and [7] and the finding reinforced the earlier finding of this study which argued that the difference in intelligent levels of the two categories of teachers was responsible for qualified graduate teachers not performing better than unqualified graduate teachers. But

in this case, where the teachers are at the same level of intelligent as measured by JAMB/Post-UME admission scores, additional qualification in education become an added advantage for qualified graduate teachers to do better than unqualified graduate teachers. The outcome of this study re-emphasize the need for unqualified teachers holding B.Sc. or HND to embark on post graduate diploma in education (PGDE) or post graduate certificate in education (PCE) (Ogbonna, 2015).

The finding further revealed that, at $P < 0.05$ significant difference existed between the academic achievement of chemistry students taught by qualified teachers with higher qualification (B.Sc. Ed) and their counterparts taught by teachers with lower qualification (NCE) in favour of teachers with higher qualification. This was in line with the finding of Abe (2014) who found out that students taught by teachers with B.Sc. Ed performed better than students taught by teachers with NCE. Apart from high qualification, one possible reason for this may be the difference in JAMB cut-off points for admission of students into university degrees (180) and colleges of education (150).

The finding of the study also showed that the academic achievement of chemistry students taught by qualified teachers with low qualification (NCE) and those taught by unqualified teachers with low qualification (ND) was statistically significant in favour of qualified teachers with low qualification (i.e NCE). This finding is in conformity with the findings of [15] and [14] who discovered that average students who were taught by qualified chemistry teachers have greater gains in the chemistry examination than students who were taught by unqualified chemistry teachers. Here again, the JAMB cut-off points for admission to colleges of education (NCE) and Polytechnics (ND) are almost the same (150) for students seeking admission into colleges of education and polytechnics. Therefore, what mattered here that led to the significant students' achievement in chemistry may be the professional training of teachers in education.

Therefore there is the need for non-professional teachers especially those with low qualification to embark on professional training in education.

CONCLUSION

The study focused on the effect of teachers' qualification on senior secondary school students' achievement in chemistry. The findings of the study showed that: there is no significant difference in the mean achievement scores of students taught by B.Sc. Ed and those taught by B.Sc.; students taught by B.Sc. plus PGDE or PCE holders had a higher mean achievement score than those taught by B.Sc. holders only. Students taught by teachers holding B.Sc.Ed or B.Ed significantly performed better than students taught by NCE holders; and students taught by NCE holders outperformed students taught by SSCE or ND holders. The study concludes that teachers' intelligent as well as professional training are the major factors that enhance their quality instruction vis – a – vis students' achievement in chemistry.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations were made:

1. Teachers' training institutions such as faculty of education, institute of education, colleges of education, National teachers institute, etc should ensure that only intelligent students are admitted to read education by raising the admission cut-off point to the level of other professional based courses.
2. Government should endeavour to enhance the conditions of service of teachers so as to attract the best brains into the teaching profession.
3. High National Diploma (HND) and Bachelor of Science (B. Sc.) graduate teachers should endeavour to enroll for post-graduate diploma in education or post-graduate certificate in education so as to make them more efficient in their classroom interaction pattern.
4. Nigeria Certificate in Education (NCE) graduates teaching chemistry at the senior secondary schools level should endeavour to

embark on in-service training programmes that will qualify them to obtain the degree in education.

5. Senior secondary Certificate Examination (SSCE) and Ordinary National Diploma (OND) holders teaching chemistry at the senior secondary school level should be encouraged to proceed on further studies in the field of education.

6. Kogi State Government and Proprietors of private secondary schools should as a matter of policy, recruit only professionally and academically qualified chemistry teachers to ensure effective teaching and learning of chemistry in Nigerian secondary schools.

REFERENCES

- [1] Federal Ministry of Education (2007). *Senior Secondary education curriculum chemistry for SS1 – SS3*, Lagos – Nigeria, Nigeria Educational Research and Development Council (NERDC) Press.
- [2] Federal Government of Nigeria (2013). *National Policy on education*, Lagos- Nigeria Nigeria Educational Research and Development Council NERDC Press.
- [3] Musau, L.M. & Migosi, J.A. (2015). Teachers' qualification and students' academic performance in science, mathematics and technology subjects in Kenya. *International Journal of educational Administration and policy studies*, 7, (3), 84 – 89.
- [4] Abe, T.O. (2014). The effect of teachers' qualification on students' performance in mathematics. *Sky Journal of education Research*, 2, (1), 10 – 14.
- [5] Abe, T.O. & Adu, E.F. (2013). The influence of qualification on computer programmed instructional package on energy concept in upper Basic Technology in Ekiti State. *Journal of Science and Technology*, 3, (6), 611 – 618.
- [6]) Ogbonna, C.C. (2015). Impact of mathematics teachers' characteristics on science education students' academic performance in tertiary institutions. *Nigerian Journal of educational research and evaluation*, 14, (1), 44 – 52.
- [7] Obele, R.A. (2016). Effect of teachers' qualification on students' mathematics achievement in secondary schools. In Z.C. Njoku (Ed), *57th Annual conference Proceeding of Science Teachers' Association*

- of Nigeria* , 466 – 471, Abuja, the STAN Place Ltd.
- [8] Igwe, D.Q. (1990). Science teachers' qualification and students' performance in secondary schools in Kano State. *Journal of Science Teachers' Association of Nigeria (STAN)*, 26, (2), 24 – 51.
- [9] Maphoso, L. & Mahlo, D. (2015). Teachers' qualifications and pupils' academic achievement. *Journal of social science*, 42, (1 & 2), 51 – 58.
- [10] Jegede, O. & Taplin, M. (2000). Trainee Teachers Perception of their knowledge about expert teaching. *Educational research*, 42, 287 – 308.
- [11] Fakeye, D.O. (2012). Teachers' qualification and subject mastery as predictors of achievement in English Language in Ibarapapa Division of Oyo state, *Global Journal of Human and social science*, 12, (3), 1 – 7.
- [12] Ezechukwu, R.I. & Ukozor, I.F. (2015). Correlates of students' achievement in SSCE chemistry in Owerri Education Zone 1 of Imo State. *Nigeria Journal of educational Research and evaluation*, 15, (1), 144 – 156.
- [13] Achimugu, L. (2005). *The Agonies of Nigerian Teachers*, Ibadan: Heinemann educational Books (Nigeria) Plc.
- [14] Unanna, A. O.; Abugo, H.O.; Dike, R.C. & Umeobika, U.C. (2013). Relationship between teachers' educational qualification and students' achievement in chemistry: A case study of Owerri West L.G.A. *Journal of Research and Method in Education*, 1, (1), 5 – 10.
- [15] Osokoya, M.M. (1999). Some determinants of secondary school students' achievement in chemistry in Oyo State, *unpublished Ph.D thesis*, Ibadan: University of Ibadan.